Title: Play That Tune!

Brief Overview:

Students will be involved in analyzing data (the length of popular songs). They will construct a line plot in order to determine the average length of a popular song.

Links to NCTM 2000 Standards:

- **Standard 1: Number and Operation**
  Mathematics instructional programs should foster the development of number and operation sense so that all students use computational tools and strategies fluently and estimate appropriately.

- **Standard 5: Data Analysis, Statistics, and Probability**
  Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students pose questions and collect, organize, and represent data to answer those questions; and interpret data using methods of exploratory data analysis.

- **Standard 6: Problem Solving**
  Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students build new mathematical knowledge through their work with problems; and monitor and reflect on their mathematical thinking in solving problems.

- **Standard 7: Reasoning and Proof**
  Mathematics instructional programs should focus on learning to reason and construct proof as part of understanding mathematics so that all students recognize reasoning and proof as essential and powerful parts of mathematics.

- **Standard 8: Communication**
  Mathematics instructional programs should use communication to foster an understanding of mathematics so that all students organize and consolidate their mathematical thinking to communicate to others; and express mathematical ideas coherently and clearly to peers, teachers, and others.

Grade/Level:

Grades 4-5

Duration/Length:

2 one-hour class period

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating and rounding
- Decimals (tenths)
- Interpreting a table
- Calculating mean (average)
- Writing to inform

Student Outcomes:

Students will:

- interpret data from a table.
- round decimals to the nearest tenth.
- create a line plot using the correct range.
- plot the rounded lengths of time on the number line.
- calculate the mean.
- interpret data for information to be used in a business letter.
- compute the number of minutes in 2 hours.
- divide by the average number of minutes in a popular song.
- write a letter to inform a DJ of the number of songs expected to be played.

Materials/Resources/Printed Materials:

- Student Resource Sheets (Day 1 Packet-- Sheets 1-4, Day 2 Packet -- Sheets 5-7)
- Calculators
- Optional: CD Player
- Optional: Some selected CD's

Development/Procedures:

Present the following situation to the class:

The Fourth grade teachers have decided to plan a *Get to Know You* dance for the students in their classes. They are planning to hire a DJ for two hours. DJ's are expensive so the students want to get the largest number of songs for their money. You are a fourth grade student. You are in charge of analyzing the lengths of the songs in order to figure out how many songs you and your classmates should hear on the day of the dance. You will write to inform the DJ of the number of songs you expect to hear based on your data analysis.

Day 1

- The teacher will display Teacher Resource Sheet #1 on the overhead, and distribute a packet to each student.
- For **Activity 1**, the students will analyze the *Lengths of Popular Songs* chart, and round each song to the nearest tenth. An example of rounding has been given to students in the student resource packet (Student Resource Sheets 1-4).
- Be sure to review and monitor their understanding of rounding as they complete this task.
- ***Note to teachers:*** When rounding the lengths of songs, remember there are 60 seconds in a minute. For example, *The Chicken Dance* by Ray Castoldi rounds to 1.0 since it is a: 56 second song. Other songs will also need to be rounded in the same way. Alert the children to the *Watch Out!* in the student packet.
- For **Activity 2**, the students will determine the range by using the chart to record the lengths of time from *least* to *greatest.*
- Finally, the students will use the information from Activity 2 to create a line plot in **Activity 3**.
- Teacher answer keys have been provided for all activities.
- Be sure to collect student packets to be redistributed the following day.

Day 2

- To motivate children, refer to a past lesson dealing with mean (average). Ideally, it would be helpful to draw attention to a line plot from a past lesson.
- Students will use the line plot to compute the mean length of a popular song and explain how it was computed.
- Students will compute the total number of songs that can be played in 2 hours.
- Students will write a letter to inform a DJ of the number of songs they expect to hear based on their data analysis.

Day 3

- Students can revise and edit their letter or write it on the computer.

Performance Assessment:

- Students will be assessed throughout this two – day task based on their performance on each of the activities by using the rubrics provided.
- The students will write to inform the DJ of how many songs they expect to hear at the dance.
- The following is an example of the writing prompt:
  Now that you know how many songs you can expect to hear at the dance, you can write your letter to the DJ. Be sure to include the following information:

- *Introduction and the name of your school*
- *An explanation of your purpose for writing*
- *The number of songs you expect to hear based on the mean*
- *An explanation of how you got your answer using at least 2 mathematical terms.*

Extension/Follow Up:

- Hold an actual dance to prove the actual number of songs.
- Supply data on classical, country, opera, jazz, etc. music and compare/contrast the lengths of songs for different types of music.
- Research reasons why certain types of music are much longer than others.
- Compare music length from different eras (1950's and 1990's). Analyze and explain data.
- Use census 2000 information (can be obtained from the Census Bureau) to create future line plots and analyze data.

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Scoring Rubrics

Student Resource Sheet #3--Chart
2 -- All lengths of music have been rounded to the nearest tenth correctly
1 -- At least 21 lengths of songs have been rounded to the nearest tenth correctly
0 -- Less than 21 lengths of songs have been rounded to the nearest tenth correctly

Student Resource Sheet #4—Line Plot
3 -- Accurate range representation; contains a title and a label for the number line; data is plotted accurately.
2 -- Accurate range representation; contains a title and a label for the number line; one to two pieces of data are plotted accurately.
1 -- Either the least or greatest range representation must be correct; contains a title and/or label for the number line; three to four pieces of data plotted inaccurately.
0 -- Other

Student Resource Sheet #5—Calculating Mean
1 -- Accurate explanation of mean (average)
0 -- Inaccurate or unclear explanation

Student Resource Sheet #6—Writing to Inform (Letter)
3 -- Introduction and name of your school; an accurate explanation of purpose for writing; accurate number of songs expected to play based on the mean; at least two mathematical terms included.
2 -- Introduction and name of your school; an explanation of purpose for writing; number of songs expected to play based on the mean; at least two mathematical terms included.
1 -- Introduction and name of your school; a partial explanation of purpose for writing; a number of songs expected to play based on the mean; at least one mathematical term included
0 -- Other

Play That Tune!

The Fourth grade teachers have decided to plan a *Get to Know You* dance for the students in their classes. They are planning to hire a DJ for two hours. DJ's are expensive so the students want to get the largest number of songs for their money. You are a fourth grade student. You are in charge of analyzing the lengths of the songs in order to figure out how many songs you and your classmates should hear on the day of the dance. You will write to inform the DJ of the number of songs you expect to hear based on your data analysis.

Lengths of Popular Songs

Name of Song	Artist	Rounded Length of Song
Wild Wild West	Will Smith	4.1
I Will Remember You	Sarah MacLachlan	3.4
No Scrubs	TLC	3.4
Baby One More Time	Britney Spears	3.3
I Want it That Way	Backstreet Boys	3.3
Goodbye	Spice Girls	4.4
Who Will Save Your Soul	Jewel	4.0
Butterfly Kisses	Bob Carlisle	5.4
MMMBop	Hanson	4.1
Save Tonight	Eagle-Eye Cherry	4.0
That Don't Impress Me Much	Shania Twain	3.4
Give Me One Reason	Tracy Chapman	4.3
Un-Break My Heart	Toni Braxton	4.3
On Bended Knee	Boyz II Men	5.3
The Hardest Thing	98	4.3
Wannabe	Spice Girls	2.5
Motown Philly	Boyz II Men	3.5
Now That We Found Love	Heavy D & The Boyz	5.3
C'mon & Ride It (The Train)	Quad City DJ's	4.0
The Chicken Dance	Ray Castoldi	1.0
Cotton Eye Joe	Rednex	3.0
Mony Mony	Tony James and the Shondells	2.5
Rollercoaster	B'Witched	3.2
I Still Believe	Mariah Carey	4.3

Activity 2:

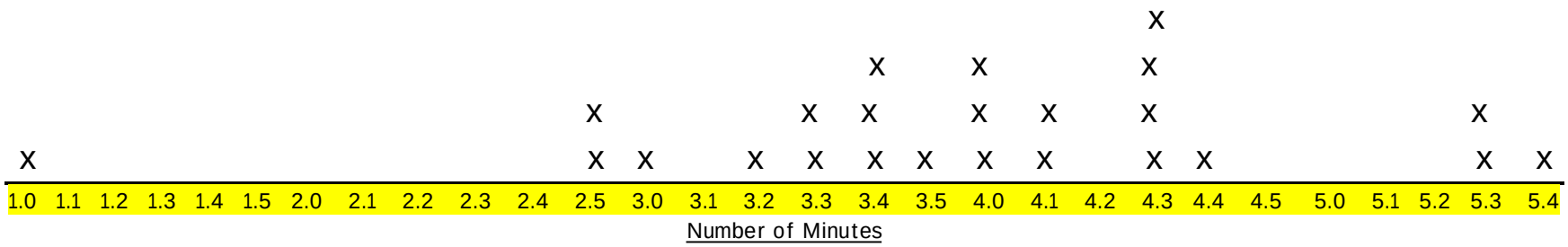
Now that you have rounded the lengths of the songs to the nearest tenth of a second, you need to determine the *range.* Use the chart below to order the lengths of time from *least* to *greatest.* This will be your *range.*

1. 1.0	*7.* 3.3	*13.* 4.0	*19.* 4.3
2. 2.5	*8.* 3.4	*14.* 4.0	*20.* 4.3
3. 2.5	*9.* 3.4	*15.* 4.1	*21.* 4.4
4. 3.0	*10.* 3.4	*16.* 4.1	*22.* 5.3
5. 3.2	*11.* 3.5	*17.* 4.3	*23.* 5.3
6. 3.3	*12.* 4.0	*18.* 4.3	*24.* 5.4

Activity 3:

Using the information from Activity 2, create a *line plot* using the line below.

Lengths of Popular Songs



Number of Minutes

Play That Tune!

Activity 1:

Using the information from your line plot that you constructed yesterday, you need to find the *mean* (the average) length of a popular song. Use your calculator to calculate the *mean*. Write it in the space below.

The average length of a popular song is ___3.8___ minutes which translates into an actual time of ___4.2___ minutes. This takes into account the amount of time to change songs and to say a few words about the artist or the song.

Activity 2:

Congratulations! You now know the average length of a popular song. You need to figure out how many songs can be played during the two - hour dance. Based on the mean that you calculated, write a number sentence that shows how to calculate the total number of songs that can be played in two hours.

120.00 / 4.2 = n (n=28.57)

Use your calculator to input the number sentence that you wrote above. Then, fill in the blank below with the total number of songs. Don't forget to round.

The DJ can play ___29___ songs at our two – hour dance.

Play That Tune!

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Activity 1:

Analyze the information on the *Lengths of Popular Songs* chart. Round each song length to the nearest tenth. Fill the rounded time into the chart on the following page. The first song has been done as an example for you in the space below.

Wild, Wild West Will Smith 4:06

The average rounded playing time for *Wild, Wild West* by Will Smith is 4:10.

Remember: Whenever the number in the hundredths place is equal to or greater than (= or >) 5, the number will be rounded up to the nearest tenth. Whenever the number in the hundredths place is less than (<)5, the number will be rounded down to the nearest tenth.

****WATCH OUT!!** Remember that there are only 60 seconds in a minute so you need to round any tenth that is greater than 5 to the nearest minute.

Lengths of Popular Songs

Name of Song	Artist	Length of Song (in Min.)
Wild Wild West	Will Smith	4:06
I Will Remember You	Sarah MacLachlan	3:41
No Scrubs	TLC	3:39
Baby One More Time	Britney Spears	3:30
I Want it That Way	Backstreet Boys	3:33
Goodbye	Spice Girls	4:44
Who Will Save Your Soul	Jewel	4:00
Butterfly Kisses	Bob Carlisle	5:38
MMMBop	Hanson	4:11
Save Tonight	Eagle-Eye Cherry	3:59
That Don't Impress Me Much	Shania Twain	3:38
Give Me One Reason	Tracy Chapman	4:31
Un-Break My Heart	Toni Braxton	4:30
On Bended Knee	Boyz II Men	5:29
The Hardest Thing	98	4:34
Wannabe	Spice Girls	2:52
Motown Philly	Boyz II Men	3:52
Now That We Found Love	Heavy D & The Boyz	5:27
C'mon & Ride It (The Train)	Quad City DJ's	4:03
The Chicken Dance	Ray Castoldi	:56
Cotton Eye Joe	Rednex	2:55
Mony Mony	Tony James and the Shondells	2:50
Rollercoaster	B'Witched	3:24
I Still Believe	Mariah Carey	4:32

Lengths of Popular Songs

Name of Song	Artist	Rounded Length of Song
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I Will Remember You	Sarah MacLachlan	
No Scrubs	TLC	
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Activity 2:

Now that you have rounded the lengths of the songs to the nearest tenth of a second, you need to determine the *range.* Use the chart below to order the lengths of time from *least* to *greatest.* This will be your *range.*

1.	*7.*	*13.*	*19.*
2.	*8.*	*14.*	*20.*
3.	*9.*	*15.*	*21.*
4.	*10.*	*16.*	*22.*
5.	*11.*	*17.*	*23.*
6.	*12.*	*18.*	*24.*

Activity 3:

Using the information from Activity 2, create a *line plot* using the line below.

Play That Tune!

Activity 1:

Using the information from your line plot that you constructed yesterday, you need to find the *mean* (the average) length of a popular song. Use your calculator to calculate the *mean*. Write it in the space below.

The average length of a popular song is _____ minutes.

On the lines below, explain how you calculated the mean.

_____

_____

_____

_____

_____

Activity 2:

Congratulations! You now know the average length of a popular song. You need to figure out how many songs can be played during the two - hour dance. Based on the mean that you calculated, write a number sentence that shows how to calculate the total number of songs that can be played in two hours.

_____

Use your calculator to input the number sentence that you wrote above. Then, fill in the blank below with the total number of songs. Don't forget to round.

The DJ can play _____ songs at our two – hour dance.

Activity 3:

Now that you know how many songs you can expect to hear at the dance, you can write your letter to the DJ. Use the lines below to write a rough draft for your letter. Be sure to include the following information:

- an introduction and the name of your school
- an explanation of your purpose for writing
- the number of songs you expect to hear based on the mean
- an explanation of how you got your answer using at least two mathematical terms

Scoring Rubrics

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